

REMOVAL ACTION GROUNDWATER MONITORING PROGRAM PLAN

GRANVILLE SOLVENTS SITE GRANVILLE, OHIO

Submitted to

**The United States Environmental Protection Agency
Emergency Response Branch, Region V
Chicago, Illinois 60673**

Developed for the

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2.0 GROUNDWATER MONITORING SYSTEM

The existing monitoring well network is comprised of 15 monitoring wells installed by the Ohio EPA and one monitoring well installed by M&E (GSS-MW2). The purpose of these wells was to detect the presence of organic constituents in the groundwater and determine the extent of their migration. An expanded groundwater monitoring program is herein proposed as a means to better define the plume and to routinely monitor groundwater for changes in the plume configuration and concentration. Figure 1 shows the locations of existing and proposed groundwater monitoring wells. Also shown on Figure 1 is the extent of the groundwater plume as currently defined, based on the detection of any parameter at concentration levels above its drinking water maximum contaminant level (MCL).

2.1 NEW GROUNDWATER MONITORING WELLS

Based on discussion of the U.S. EPA and Ohio EPA comments on the initial version of this plan and comments provided on May 12, 1995, and June 12, 1995, and the meeting held between the U.S. EPA and the GSS PRP Group on July 10, 1995, thirteen groundwater monitoring wells are proposed to be installed to help to define the extent of the plume to the north, south, and east of the GSS. Three new deep wells (GSS-MW3D, GSS-MW12, and GSS-MW13) are proposed within the GSS to provide additional information on the vertical distribution of contaminant concentrations and to define vertical hydraulic gradients. All new wells and piezometers will be designated GSS-MW(X) or GSS-P(X). Because a number of these wells will be installed off the GSS property, the locations are tentative, pending access approval by the land owners.

Monitor well GSS-MW2 was installed by M&E in November 1994 to define the southwestern margin of the plume. The boring log and well construction diagram for GSS-MW2 are contained in the December 1, 1994, Operational Plan for the aquifer pumping test. Groundwater from GSS-MW2 was sampled on February 21, 1995, and analyzed for Volatile Organic Compounds (VOCs). Chlorinated VOCs were not detected at GSS-MW2, however, acetone was reported at 14 $\mu\text{g/l}$ but was also detected in the field blank at 38 $\mu\text{g/l}$, indicating that the acetone detection for GSS-MW2 is likely a result of sampling or laboratory effects. Consequently, the southwestern limit of the plume has now been defined. Monitoring of GSS-MW2 will be continued.

Based on discussions at the March 20, 1995, meeting and site visit, and subsequent comments on May 12, 1995, a total of thirteen additional monitor wells will be installed to more fully define the groundwater plume. Eleven of the wells will be installed to delineate the plume to the north (4 wells), south (1 well), and east (3 wells), and to provide a sentinel network between the GSS and the Village well field (3 wells). The other two wells (GSS-MW12 and GSS-MW3) are deep wells within the known plume as discussed below. Plans for installation of one of the new wells, GSS-MW1, were discussed in the December 1, 1994, Operational Plan and M&E comment response documents. However, access to the property has not been granted by the property owner. The well is proposed to be placed about 100 feet north of MW-8 to provide information on the northern extent of the plume (Figure 1) pending granting of access to the property.

The wells are proposed to be installed at the locations shown on Figure 1, subject to being provided access to the property. Monitoring wells GSS-MW3, GSS-MW3D, and GSS-MW4 would be located east of the Cherry Street Bridge to delineate the eastern margin of the plume and provide additional monitoring of the vertical distribution of the plume. The U.S. EPA and Ohio EPA have suggested a fourth new well in this area. However, considering the limited area and access difficulties to the east of the bridge, it is herein proposed that two shallow wells, GSS-MW3 and GSS-MW4, and one deep well pairing GSS-MW3 be installed to monitor the water quality in the area. The U.S. EPA has agreed to allow the GSS PRP Group to install and sample these proposed wells and to evaluate the results. If necessary, consideration will be given to the need for additional wells. Proposed monitoring wells GSS-MW5, GSS-MW6, and GSS-MW11 would be placed north of Palmer Lane to define the northern extent of the plume along with GSS-MW1 discussed above. GSS-MW11 has been added as a proposed well since the March 15 version of this plan, as recommended by the U.S. EPA and Ohio EPA. Well GSS-MW7 would be installed to determine the southern plume margin. At the March 20 meeting, the U.S. EPA and Ohio EPA initially suggested two new wells to the south of the GSS rather than one. Considering the limited area in question and the difficulties with access to the wooded area near Raccoon Creek, one well will be installed at this time. Wells GSS-MW8 through GSS-MW10 would be installed between extraction well GSS-EW1 and Village production well PW-1 now out of service, to provide a "sentinel" network beyond the western margin of the plume. The new wells will also be useful in defining the groundwater flow directions and flow divides between the extraction well EW-1, and Village production wells.

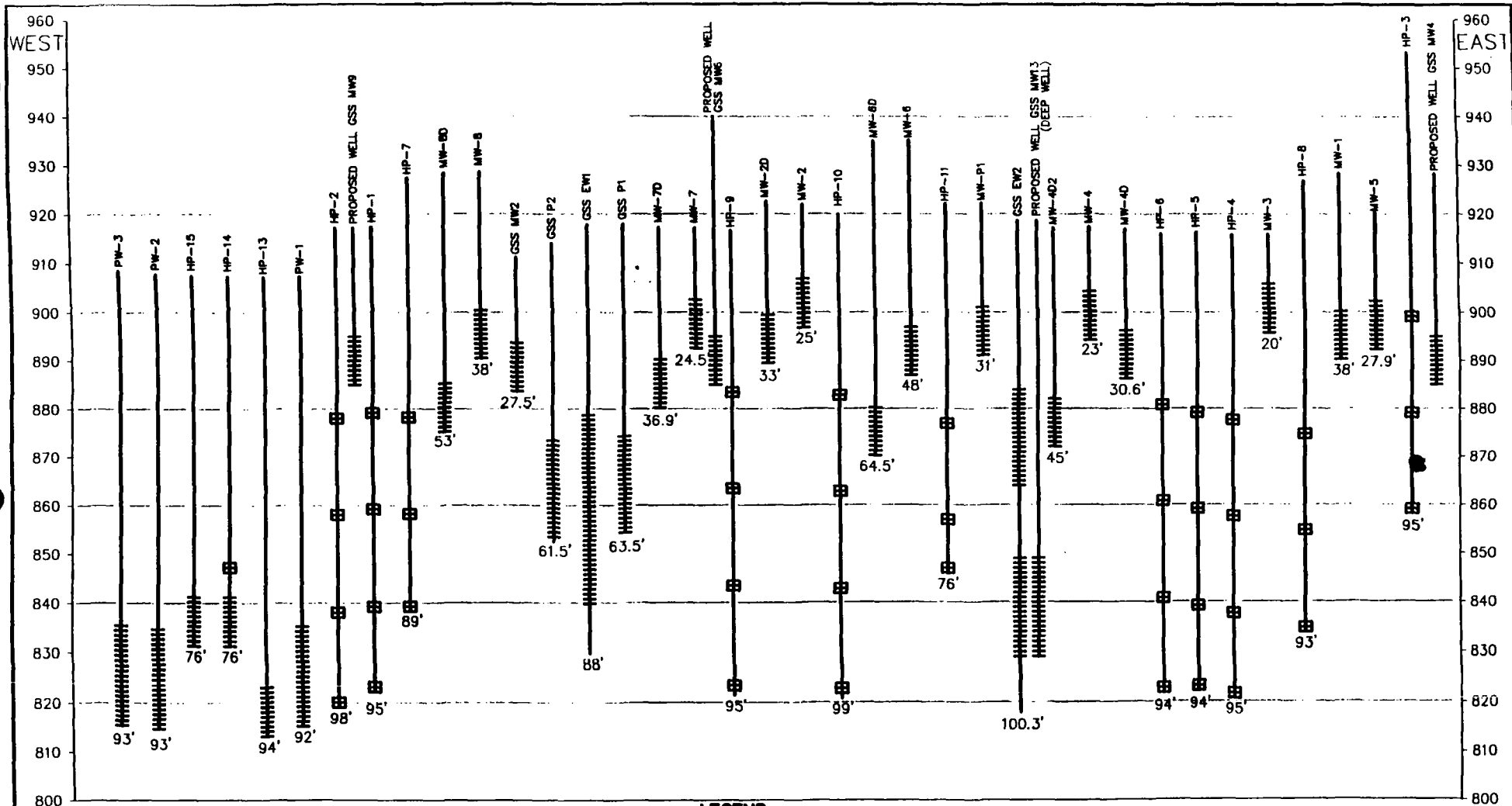


TABLE 1
GRANVILLE SOLVENTS SITE
GROUNDWATER MONITORING PROGRAM
YEAR 1

Well	VOCs Quarterly	VOCs Semi- Annually	VOCs, Annually	SVOCs, Metals, Semi- Annually, Annually	Water Levels Only	To Be Abandoned
MW-1			✓	✓		
MW-2					✓	
MW-2D			✓	✓		
MW-3					✓	
MW-4						✓
MW-4D			✓	✓		
MW-4D2			✓	✓		
MW-5**			✓	✓		
MW-6			✓	✓		
MW-6D***					✓	
MW-7					✓	
MW-7D			✓			
MW-8	✓					
MW-8D***					✓	
MW-P1			✓			
GSS-MW2		✓				
GSS-MW14 (Formerly HP-13)	✓					
HP-14 (Piezometer)					✓	
HP-15 (Piezometer)					✓	
GSS-P1 (Piezometer)					✓	
GSS-P2 (Piezometer)					✓	
GSS-MW1*	✓					
GSS-MW3*		✓				
GSS-MW3D*		✓				
GSS-MW4*		✓				
GSS-MW5*		✓				
GSS-MW6*	✓					
GSS-MW7*		✓				
GSS-MW8*	✓					

All of the existing wells will be periodically checked for integrity. Any observed problems will be remedied. If a given well has questionable integrity, the condition will be noted and abandonment of the well may be proposed to the U.S. EPA and Ohio EPA.

4.0 WELL INSTALLATION PROCEDURES

4.1 CLEANING OF DRILLING EQUIPMENT

Before and after each well installation, the drill rig and all down hole equipment will be cleaned with a high pressure, high temperature wash. Decontamination water and solids will be contained on a constructed pad, tested and properly disposed. Both will be collected in 55-gallon steel drums and the water will be collected and disposed through the air stripper currently operating on site.

4.2 SOIL BORINGS AND SAMPLING

To ensure screening of the wells over the proper interval, a soil boring will be drilled prior to each well and piezometer installation. Each of the borings will be sampled through 4 1/4-inch inside diameter (ID) hollow stem augers from the ground surface to the targeted zone with a split-spoon sampler at two foot intervals. All soil cuttings will be properly contained. Soil cuttings from borings within areas of known soil impact will be tested and properly disposed.

Soil samples collected during the drilling of GSS-MW13 will be field screened for non-aqueous phase liquids as suggested by the U. S. EPA. Soil samples will be field screened for total VOCs by using either an HNu or an OVA and taking a reading every 6 inches within each 2 foot split-spoon referenced. To aid in the detection of non-aqueous phase liquid (NAPL), separation tests will be conducted with the aid of hydrophobic dye as described in Caben, *et al.*, 1992, *Evaluation of Visual Methods to Detect NAPL in Soil and Water*.

4.3 MONITORING WELL AND PIEZOMETER CONSTRUCTION

All the new groundwater monitoring wells except the two proposed deep wells will be constructed similarly to recently installed GSS-MW2. Riser casing will consist of flush threaded, 2-inch inside diameter (ID), Schedule 40 PVC. The well screens will be constructed from flush threaded 2-inch inside diameter, 10 foot long, 0.01-inch factory machined slot Schedule 40 PVC. Monitor well screens will be placed from 5 to 15 feet below the water table. Proposed wells GSS-MW4, GSS-MW6, and GSS-MW9 are shown on Figure 2 to illustrate examples of the planned screen depths and elevations. (Note that not all proposed wells are shown on Figure 2.) The deep wells will be constructed of the same

4.4 SURVEYING

An elevation reference point will be marked on the top of the riser casing of the well. The ground surface and top of casing (reference point) elevations for all wells will be determined to within 0.001 foot above mean sea level (AMSL) by a licensed surveyor.

4.5 WELL DEVELOPMENT

No sooner than 48 hours after installation, each monitoring well and piezometer will be developed. The wells will be developed by the pump and surge method by alternately removing water with a properly decontaminated stainless steel surge bailer and pump. Development will continue until the turbidity of the water is substantially reduced based on visual inspection. Development water will be contained and placed in the on-site air stripper holding tank for treatment prior to discharge.

4.6 GROUNDWATER MONITORING WELL SAMPLING

The objective of the sampling procedure is to collect groundwater from these wells that are representative of the groundwater within the aquifer at that location. The following procedures will be followed to meet this objective. To be useful and accurate, a groundwater sample must be representative of the particular saturated zone of the substrata being sampled. the physical, chemical and bacteriological integrity of the sample must be maintained from the time of sampling to the time of testing in order to keep any changes in water quality parameters to a minimum. The collection of a groundwater sample is made up of the following steps:

- 1) Fill out sample labels for each of the required sample containers and place labels onto appropriate sample containers.
- 2) Open well cap and use OVA to monitor the escaping gases at the wellhead.
- 3) Sound the well for total depth and water level; record these data in field notebook.
- 4) Lower pump into the well to a short distance below the water level and begin purging, approximately 3 to 5 well volumes.
- 5) After purging, ensure that groundwater samples are representative of actual conditions. Samplers must work efficiently to minimize the loss of groundwater contaminants and the introduction of foreign contaminants. To prevent contamination of samples, the sample

5.0 SAMPLING AND ANALYSIS

The following sections describe the procedures for collection and analysis of groundwater and treatment system samples and the measurement of water levels.

5.1 GROUNDWATER SAMPLING PARAMETERS AND FREQUENCY

Subsets of wells will be monitored quarterly, semi-annually, and annually as listed in Table 1. Seven wells (MW-8, GSS-MW1, GSS-MW-6, GSS-MW8, GSS-MW9, GSS-MW10 and GSS-MW14 (formerly HP-13)) will be sampled quarterly. These wells were selected for the most frequent sampling because they are located near the leading edge of the plume, in the direction of the well field. Seven wells (GSS-MW2, GSS-MW3, GSS-MW3D, GSS-MW4, GSS-MW5, GSS-MW7, and GSS-MW11) will be sampled semiannually. The semiannual wells are located near the northern, eastern, and southern fringes of the plume. Data for semiannual and quarterly wells will allow monitoring for changes in the plume configuration. Ten wells, located generally within or near the areas of highest concentrations (MW-1, MW-2D, MW-4D, MW-4D2, MW-5, MW-6, MW-7D, MW-P1, GSS-MW12 and GSS-MW13) will be sampled annually primarily to monitor for changes in concentrations over time due to removal of the most highly impacted water at GSS-EW2. The need for sampling of GSS-MW-13, MW-7D, and GSS-MW12 are detections above MCL, in other wells.

All groundwater samples will be analyzed for VOCs using U.S. EPA method 524.2. Appendix A provides a list of the monitoring parameters and detection limits.

Consideration was given to the need for monitoring for semivolatile organic compounds (SVOCs) and metals. On January 30, 1991, and March 26, 1991, groundwater samples were analyzed for SVOCs. The U.S.EPA states in the Screening Site Inspection Site Evaluation of November 29, 1993 that no positively identified SVOCs were detected in any of the samples. Samples of the influent from the extraction wells have been collected since the treatment system has been in operation. The influent and effluent data are listed on Appendix B. The only SVOC detected in the treatment system influent and effluent is bis(2-ethylhexyl)phthalate. This compound has been reported in all influent and effluent samples at concentrations ranging from 0.9 to 45 $\mu\text{g/l}$, with most detections estimated at below 10 $\mu\text{g/l}$. As noted in the January 31, 1995 Aquifer Pumping Test Report, it is likely that the detection of bis(2-ethylhexyl)phthalate is attributable to the plastics used in the treatment system piping. To provide an

be required. All samples for metals will be analyzed by using U.S. EPA Methods 6010 and 7470. Appendix A provides a list of monitoring parameters and detection limits. Effluent water samples will continue to be collected and analyzed for metals as required to meet the substantive requirements set forth by the Ohio EPA for NPDES discharge.

5.2 GROUNDWATER SAMPLING PROCEDURES

5.2.1 Decontamination

To reduce the possibility for cross contamination, dedicated pumps will be placed in the wells. All non-dedicated measuring, purging, and sampling equipment will be decontaminated prior to purging and sample collection. Decontamination will include washing all development and sampling equipment with a non-phosphate laboratory detergent, potable water rinse, a methanol rinse as necessary (not used for pump decontamination), followed by a triple rinse with laboratory grade deionized water.

5.2.2 Water Level Measurements

During all sampling events and hydraulic performance evaluations, groundwater elevations will be determined in all available wells and piezometers. If groundwater sampling will be performed, a complete circuit of water levels will be measured before purging and sampling. Water level measurements will be recorded beginning with the non-impacted wells, progressing to the slightly impacted wells, and ending with the wells most highly impacted. Measurements will be made consecutively in a minimal amount of time. Groundwater levels will be measured with respect to surveyed reference points marked on the riser casing of each well. The elevation of Raccoon Creek will be measured from the surveyed location on the Cherry Street Bridge. Water levels will be obtained using either an electrical water level tape and probe or a chalked, weighted surveyor's tape. The procedures for measuring water levels will be as follows.

1. Check operation of recording equipment above ground. Prior to opening the well, don personal protective equipment as required.
2. All ground water level measurement devices must be decontaminated at each location to prevent cross contamination of wells.
3. Record all information in the field notebook.

5.2.4 Sample Collection

Samples will be obtained with the same pumps used to purge the well. The pumping rate will be reduced before sampling to provide a flow of approximately 100 mL per minute to minimize agitation. Samples will be collected by pumping directly into each of the required containers. Bottles will be filled completely, but will not be overflowed. The VOC bottles will be filled so that no headspace exists.

The samples for VOC analyses will be collected in 40 mL glass septum vials with Teflon-lined lids. No preservative will be added. The maximum holding time for VOCs is 7 days. SVOC analyses will be collected in 1 liter amber glass bottles, no preservative will be used and holding time for SVOCs is 7 days until extraction, and 40 days to analysis after extraction. Metals analyses will be collected in 500 ml plastic bottles and will be preserved with nitric acid. The maximum holding time for metals is 180 days except for mercury which is 28 days.

A detailed field data sheet for each well will be completed during each sampling event. The field data sheet will document actual sampling and purging procedures and observations. The integrity of all monitor wells will be checked and noted during each sampling event.

5.2.5 Sample Handling

To prevent misidentification of samples, a label will be securely fixed to each sample container. These will be waterproof and carry the following information:

- Project name and number
- Sample identification and number
- Analytical parameter(s) and method
- Initials of collector
- Date and time of collection
- Preservatives used

The labels will be affixed to the appropriate sample containers at the laboratory, prior to shipment to the site, and completed in the field.

QA/QC SAMPLES FOR GROUNDWATER SAMPLING EVENTS

Quarterly Monitoring Well Samples	Field Duplicates	Field Blanks	Trip Blanks	Matrix Spikes	Matrix Spike Duplicates	Total Number of Samples
6	1	1	1	1	1	11
Semi-Annually Monitoring Well Samples	Field Duplicates	Field Blanks	Trip Blanks	Matrix Spikes	Matrix Spike Duplicates	Total Number of Samples
14	1	1	1	1	1	19
Annually Monitoring Well Samples	Field Duplicates	Field Blanks	Trip Blanks	Matrix Spikes	Matrix Spike Duplicates	Total Number of Samples
24	2	2	2	2	2	34

6.0 TREATMENT SYSTEM PERFORMANCE SAMPLING AND ANALYSIS

Weekly sampling of the air stripper influent and effluent began with the system start-up on December 20, 1994 and continued through January 24, 1995. Sampling is now conducted on a monthly schedule. Monthly sampling of the influent and effluent will continue during the treatability study. Following the treatability study, monthly samples will be collected for VOCs by U.S. EPA Method 524.2.

Influent and effluent samples will be collected from sampling valve ports in the discharge line within the treatment building. The influent port used to sample the untreated groundwater is located on the downstream side of the bag filter located between the 2500 gallon surge tank and the air stripper. The effluent port used to sample the groundwater after treatment is located on the back side of the air stripper on the east side of the blower.

Sampling of the influent and effluent will take place when the transfer pump from the holding tank to the stripper is operating and has been operating for at least 5 minutes. During this 5 minute period, the influent and effluent sampling ports will be opened to allow flushing at a slow rate (approximately 0.5 gallon per minute). The flushed water will be collected and recirculated into the holding tank for treatment after sampling is complete. After flushing, the port valves will be adjusted to reduce the flow rate to 100 mL/minute. The influent sample will be collected first followed by the effluent sample.

The analytical results from the effluent sample will be used as the discharge values for the outfall.

APPENDIX A
MONITORING PARAMETERS AND DETECTION LIMITS

MONITORING PARAMETERS AND DETECTION LIMITS
(Continued)

Parameter	Method	Detection Limits	Holding Time	Preservation	Bottle Size/Type
1,1,2,2-Tetrachloroethane	EPA 524.2	1 µg/l	7 days	Cool to 4°C	2-40 ml glass vials
Chlorobenzene	EPA 524.2	1 µg/l	7 days	Cool to 4°C	2-40 ml glass vials
Styrene	EPA 524.2	1 µg/l	7 days	Cool to 4°C	2-40 ml glass vials
Semivolatile Organic Compounds					
Acenaphthene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
1,2,4-Trichlorobenzene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Hexachlorobenzene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Hexachloroethane	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Bis(2-chloroethyl)ether	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
2-Chloronaphthalene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
1,2-Dichlorobenzene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
1,3-Dichlorobenzene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
1,4-Dichlorobenzene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
3,3'-Dichlorobenzidine	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
2,4-Dinitrotoluene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
2,6-Dinitrotoluene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Fluoranthene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass

MONITORING PARAMETERS AND DETECTION LIMITS
(Continued)

Parameter	Method	Detection Limits	Holding Time	Preservation	Bottle Size/Type
Diethyl phthalate	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Dimethyl phthalate	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Benzo(a)anthracene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Benzo(a)pyrene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Benzo(b)fluoranthene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Benzo(k)fluoranthene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Chrysene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Acenaphthylene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Anthracene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Benzo(g,h,i)perylene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Fluorene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Phenanthrene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Dibenz(a,h)anthracene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Indeno(1,2,3-C,D)pyrene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Pyrene	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass

MONITORING PARAMETERS AND DETECTION LIMITS
(Continued)

Parameter	Method	Detection Limits	Holding Time	Preservation	Bottle Size/Type
Pentachlorophenol	SW-846 8270	50 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Phenol	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Benzoic Acid	SW-846 8270	50 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
2-Methylphenol	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
4-Methylphenol	SW-846 8270	10 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
2,4,5-Trichlorophenol	SW-846 8270	50 µg/l	7 days until extraction, 40 days from extraction until analysis	Cool to 4°C	2-1 L amber glass
Metals					
Aluminum	SW-846 6010	15 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Antimony	SW-846 6010	3 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Arsenic	SW-846 6010	3 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Barium	SW-846 6010	5 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Beryllium	SW-846 6010	1 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Cadmium	SW-846 6010	1 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Calcium	SW-846 6010	100 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Chromium	SW-846 6010	5 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Cobalt	SW-846 6010	5 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Copper	SW-846 6010	5 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Iron	SW-846 6010	50 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Lead	SW-846 6010	2 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Magnesium	SW-846 6010	100 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Manganese	SW-846 6010	5 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Mercury	SW-846 7470	0.2 µg/l	28 days	HNO ₃ to pH <2	1-500 ml plastic
Nickel	SW-846 6010	5 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Potassium	SW-846 6010	100 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic
Selenium	SW-846 6010	5 µg/l	180 days	HNO ₃ to pH <2	1-500 ml plastic

APPENDIX B
ANALYTICAL DATA FOR TREATMENT SYSTEM INFLUENT AND EFFLUENT
AT THE GRANVILLE SOLVENTS SITE

ANALYTICAL DATA FOR TREATMENT SYSTEM INFLUENT AND EFFLUENT AT THE GRANVILLE SOLVENTS SITE

Sample Number		N1-24-95 (b)		F1-24-95 (c)		N2-15-95 (b)		F2-15-95 (c)		N3-15-95 (b)		F3-15-95 (c)	
Date Sampled		1/24/95		1/24/95		2/15/95		2/15/95		3/15/95		3/15/95	
Units	MCLs	µg/l		µg/l		µg/l		µg/l		µg/l		µg/l	
Pumping Well (a)	µg/l	Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2	
Parameter													
Aluminum	50 to 200 (d)	11.1	U	11	U	18.7		15.2		11.1	U	20.4	
Antimony	6	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U
Arsenic	50	5.5	U	3.1		3.2		2.5	U	2.5	U	3.4	
Barium	2000	112		111		111		110		114		114	
Beryllium	4	0.11		0.1		0.07	U	0.07	U	0.07		0.09	
Cadmium	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Calcium	NA	113000		113000		109000		107000		113000		112000	
Chromium	100	0.5	U	0.5	U	0.61		0.5	U	0.5	U	0.5	U
Cobalt	NA	0.9	U	0.89	U	0.9	U	0.9	U	0.9	U	0.9	U
Copper	1000(d)	0.8	U	0.8	U	4.4		0.8	U	0.8	U	0.8	U
Iron	300(d)	1990		979		2370		1130		1120		1180	
Lead	15	4.6		0.99	U	2.8		1	U	1	U	1	U
Magnesium	NA	34400		34300		33800		33200		34500		34200	
Manganese	50(d)	65.4		65.4		76.6		68.9		67.7		67.5	
Mercury	2	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.1	
Nickel	100	2.3		1.2	U	2.8		1.3		1.2	U	1.2	U
Potassium	NA	2640		2630		2730		2680		2650		2650	
Selenium	50	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Silver	100 (d)	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
Sodium	NA	27700		28300		26000		25500		28300		28600	
Thallium	2	3	U	3	U	3	U	3	U	3.2		4	
Vanadium	NA	0.9	U	0.89	U	0.9	U	0.9	U	0.9	U	0.9	U
Zinc	5000(d)	85.1		4.6		26		2		33.7		2.9	

See end of table for Key.

ANALYTICAL DATA FOR TREATMENT SYSTEM INFLUENT AND EFFLUENT AT THE GRANVILLE SOLVENTS SITE

Sample Number		N122094 (b)		F122094 (c)		I1395 (b)		E1395 (c)		N1-9-95 (b)		F1-9-95 (c)		N1-17-95 (b)		F1-17-95 (c)	
Date Sampled	MCLs	12/20/94		12/20/94		1/3/95		1/3/95		1/9/95		1/9/95		1/17/95		1/17/95	
Pumping Well (a)	µg/l	Extraction Well 1		Extraction Well 1		Extraction Well 1		Extraction Well 1		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2	
Parameter																	
Benzyl butyl phthalate	100	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Di-n-butyl phthalate	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Di-n-octyl phthalate	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Diethyl phthalate	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Dimethyl phthalate	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(a)anthracene	0.1	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(a)pyrene	0.2	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(b)fluoranthene	0.2	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(k)fluoranthene	0.2	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chrysene	0.2	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Acenaphthylene	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Anthracene	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(g,h,i)perylene	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Fluorene	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Phenanthrene	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Dibenz(a,h)anthracene	0.3	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Indeno(1,2,3-C,D)pyrene	0.4	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Pyrene	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzyl Alcohol	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Chloroaniline	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Dibenzofuran	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Methylnaphthalene	NA	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Nitroaniline	NA	50	U	50	U	26	U	26	U	25	U	25	U	25	U	25	U
3-Nitroaniline	NA	50	U	50	U	26	U	26	U	25	U	25	U	25	U	25	U

See end of table for Key.

ANALYTICAL DATA FOR TREATMENT SYSTEM INFLUENT AND EFFLUENT AT THE GRANVILLE SOLVENTS SITE

Sample Number		N1-24-95		F1-24-95		N2-15-95		F2-15-95		N3-15-95		F3-15-95	
Date Sampled	MCLs	1/24/95		1/24/95		2/15/95		2/15/95		3/15/95		3/15/95	
Pumping Well (a)	µg/l	Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2	
Parameter													
Acenaphthene	NA	10	U	10	U	10	U	10	U	10	U	10	U
1,2,4-Trichlorobenzene	70	10	U	10	U	10	U	10	U	10	U	10	U
Hexachlorobenzene	NA	10	U	10	U	10	U	10	U	10	U	10	U
Hexachloroethane	NA	10	U	10	U	10	U	10	U	10	U	10	U
Bis(2-chloroethyl)ether	NA	10	U	10	U	10	U	10	U	10	U	10	U
2-Chloronaphthalene	NA	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichlorobenzene	600	10	U	10	U	10	U	10	U	10	U	10	U
1,3-Dichlorobenzene	600	10	U	10	U	10	U	10	U	10	U	10	U
1,4-Dichlorobenzene	75	10	U	10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	NA	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dinitrotoluene	NA	10	U	10	U	10	U	10	U	10	U	10	U
2,6-Dinitrotoluene	NA	10	U	10	U	10	U	10	U	10	U	10	U
Fluoranthene	NA	10	U	10	U	10	U	10	U	10	U	10	U
4-Chlorophenyl phenyl ether	NA	10	U	10	U	10	U	10	U	10	U	10	U
4-Bromophenyl phenyl ether	NA	10	U	10	U	10	U	10	U	10	U	10	U
Bis(2-chloroisopropyl)ether	NA	10	U	10	U	10	U	10	U	10	U	10	U
Bis(2-chloroethoxy)methane	NA	10	U	10	U	10	U	10	U	10	U	10	U
Hexachlorobutadiene	1(e)	10	U	10	U	10	U	10	U	10	U	10	U
Isophorone	NA	10	U	10	U	10	U	10	U	10	U	10	U
Naphthalene	NA	10	U	10	U	10	U	10	U	10	U	10	U
Nitrobenzene	NA	10	U	10	U	10	U	10	U	10	U	10	U
N-nitrosodiphenylamine	NA	10	U	10	U	10	U	10	U	10	U	10	U
N-nitrosodipropylamine	NA	10	U	10	U	10	U	10	U	10	U	10	U
Bis(2-ethylhexyl)phthalate	6	2	J	0.9	J	2	JB	2	JB	46	B	18	

See end of table for Key.

ANALYTICAL DATA FOR TREATMENT SYSTEM INFLUENT AND EFFLUENT AT THE GRANVILLE SOLVENTS SITE

Sample Number		N1-24-95		F1-24-95		N2-15-95		F2-15-95		N3-15-95		F3-15-95	
Date Sampled	MCLs	1/24/95		1/24/95		2/15/95		2/15/95		3/15/95		3/15/95	
Pumping Well (a)	µg/l	Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2	
Parameter													
4-Nitroaniline	NA	25	U	25	U	26	U	26	U	26	U	26	U
2,4,6-Trichlorophenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
p-Chloro-m-cresol	NA	10	U	10	U	10	U	10	U	10	U	10	U
2-Chlorophenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dichlorophenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dimethylphenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
2-Nitrophenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
4-Nitrophenol	NA	25	U	25	U	26	U	26	U	26	U	26	U
2,4-Dinitrophenol	NA	25	U	25	U	26	U	26	U	26	U	26	U
4,6-Dinitro-2-methylphenol	NA	25	U	25	U	26	U	26	U	26	U	26	U
Pentachlorophenol	1	25	U	25	U	26	U	26	U	26	U	26	U
Phenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
Benzoic Acid	NA	25	U	25	U	26	U	26	U	26	U	26	U
2-Methylphenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
4-Methylphenol	NA	10	U	10	U	10	U	10	U	10	U	10	U
2,4,5-Trichlorophenol	NA	25	U	25	U	26	U	26	U	26	U	26	U

See end of table for Key.

ANALYTICAL DATA FOR TREATMENT SYSTEM INFLUENT AND EFFLUENT AT THE GRANVILLE SOLVENTS SITE

Sample Number		N122094 (b)		F122094 (c)		I1395 (b)		E1395 (c)		N1-9-95 (b)		F1-9-95 (c)		N1-17-95 (b)		F1-17-95 (c)	
Date Sampled		12/20/94		12/20/94		1/3/95		1/3/95		1/9/95		1/9/95		1/17/95		1/17/95	
Units	MCLs	µg/l		µg/l		µg/l		µg/l		µg/l		µg/l		µg/l		µg/l	
Pumping Well (a)	µg/l	Extraction Well 1		Extraction Well 1		Extraction Well 1		Extraction Well 1		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2	
Parameter																	
4-Methyl-2-Pentanone	NA	0.5	U	0.5	U	5	U	5	U	25	U	5	U	25	U	5	U
Methylene Chloride	NA	0.5	U	0.5	U	1	U	1	U	5	U	1	U	5	U	1	U
Styrene	100	0.5	U	0.5	U	1	U	1	U	5	U	1	U	5	U	1	U
1,1,2,2-Tetrachloroethane	NA	0.5	U	0.5	U	1	U	1	U	5	U	1	U	5	U	1	U
Tetrachloroethene	5	0.5	U	0.5	U	1	U	1	U	79		1		64		0.9	J
Toluene	1000	1		0.4	J	1	U	1	U	5	U	1	U	5	U	1	U
1,1,1-Trichloroethane	200	0.5	U	0.5	U	1	U	1	U	21		1	U	15		1	U
1,1,2-Trichloroethane	5	0.5	U	0.5	U	1	U	1	U	5	U	1	U	5	U	1	U
Trichloroethene	5	3		0.5	U	1	U	1	U	24		1	U	22		1	U
Vinyl Chloride	2	0.5	U	0.5	U	1	U	1	U	5	U	1	U	5	U	1	U
m & p Xylenes	10,000	0.5	U	0.5	U	1	U	1	U	5	U	1	U	5	U	1	U
o-Xylenes	10,000	0.5	U	0.5	U	1	U	1	U	5	U	1	U	5	U	1	U

See end of table for Key.

ANALYTICAL DATA FOR TREATMENT SYSTEM INFLUENT AND EFFLUENT AT THE GRANVILLE SOLVENTS SITE

Sample Number		N1-24-95 (b)		F1-24-95 (c)		N2-15-95 (b)		F2-15-95 (c)		N3-15-95 (b)		F3-15-95 (c)	
Date Sampled		1/24/95		1/24/95		2/15/95		2/15/95		3/15/95		3/15/95	
Units	MCLs	µg/l		µg/l		µg/l		µg/l		µg/l		µg/l	
Pumping Well (a)	µg/l	Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2		Extraction Well 1,2	
Parameter:													
4-Methyl-2-Pentanone	NA	25	U	5	U	33	U	5	U	12	U	5	U
Methylene Chloride	NA	5	U	1	U	7	U	1	U	2	U	1	U
Styrene	100	5	U	1	U	7	U	1	U	2	U	1	U
1,1,2,2-Tetrachloroethane	NA	5	U	1	U	7	U	1	U	2	U	1	U
Tetrachloroethane	5	79		1		130		1	U	110		0.3	J
Toluene	1000	5	U	1	U	7	U	1	U	2	U	1	U
1,1,1-Trichloroethane	200	23		0.3	J	35		1	U	38		1	U
1,1,2-Trichloroethane	5	5	U	1	U	7	U	1	U	2	U	1	U
Trichloroethene	5	17		0.8	J	53		1	U	57		1	U
Vinyl Chloride	2	5	U	1	U	7	U	1	U	2	U	1	U
m & p Xylenes	10,000	5	U	1	U	7	U	1	U	2	U	1	U
o-Xylenes	10,000	5	U	1	U	7	U	1	U	2	U	1	U

KEY:

(a) - The pumping well refers to the extraction wells from which the air stripper is drawing water.

(b) - These samples were collected from the influent water from the stripper.

(c) - These samples were collected from the effluent water from the stripper.

(d) - Secondary Maximum Contaminant Level (SMCL).

(e) - Nonenforceable Maximum Contaminant Level Goal (MCLG).

(f) - Total trihalomethane concentration cannot exceed 100 µg/l.

Shading indicates exceedance of Maximum Contaminant Level (MCL) or MCLG, or SMCL, *Drinking Water Regulations and Health Advisories*, November 1994.

MCL - Maximum Contaminant Level, November 1994.

NA - Not Applicable

U - The parameter was not detected. The associated number is the quantitation limit

B - The compound was detected in an associated blank.

J - The compound was detected, but at a concentration less than the reporting limit.